



KNOWLEDGE TEST AND SKILLS LIST

Avalon Fetal Monitor

FM20 / FM30 / FM40 / FM50

Release F.0 with Software Revision F.01.xx

FETAL MONITORING

PHILIPS

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Introduction

About this Competency Test

Competency can be defined as having the knowledge, skill and attitude to perform given tasks correctly or according to standards. Continuing competency can also be defined as performance of job tasks consistently according to standards.

Based on this definition, this book contains a knowledge test to determine the user's knowledge of the FM20, FM30, FM40, and FM50 fetal monitor.


In addition, a skills checklist has been included that can be used to determine the clinical user's ability to perform basic monitor tasks.

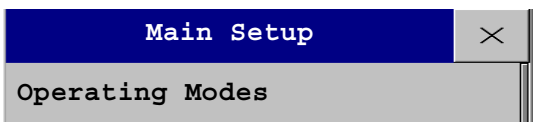
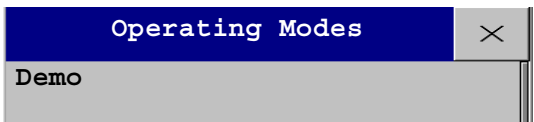
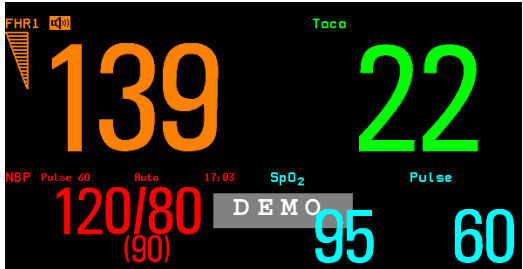
Demo Mode

Most of the patient data required for the skills list can be generated in the monitor's Monitoring mode. Sometimes you will need to apply a measurement sensor to yourself. For some tasks you have to use the fetal monitor's demonstration (Demo) mode. During this competency test, you need to switch between Demo and Monitoring mode.

WARNING Demo mode is for demonstration and training purposes only. Never use Demo mode when a patient is attached to the monitor. When you enter Demo mode, all stored trend information and patient demographics are deleted from the monitor's memory. When you have completed your training tasks, always exit Demo mode. When you exit Demo mode, all stored trend information and patient demographics are deleted from the monitor's memory, and the monitor is reset to its default settings.


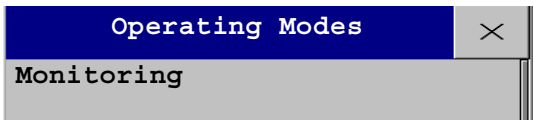
Activating Demo Mode

1	Select the Main Setup SmartKey.	
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2	In the Main Setup menu, scroll down and select Operating Modes .	
3	From the Operating Modes menu, select Demo .	
4	Using the pop-up keyboard, type in the password 14432 and select Enter . Numeric values or readings appear together with a flashing Demo flag.	

Exiting Demo Mode

When you have completed your training tasks, always exit Demo mode. When you leave Demo mode, the monitor **clears all demo data** from the monitor's memory and uses the **default user settings**.

1	Select the flashing Demo flag on the screen or cycle power to exit the Demo mode.	
2	From the Operating Modes menu, select Monitoring .	

References

This competency test is additional to, and does not replace, the monitor's Instructions for Use. It is a training tool. For full operating instructions and safety-related information, it is essential to read the Instructions for Use. Before monitoring patients you must have a comprehensive understanding of patient monitoring.

The following documentation was shipped with your Avalon Fetal Monitor:

- Instructions for Use
- Quick guide
- Training guide (English only)
- Avalon training video
- Fetal Monitoring Documentation DVD, which contains the Service guide, the Training guide, and the above documents as pdf files (readable with Adobe Reader), as well as all other documents associated with this monitor:
 - Application notes (English only)
 - Configuration guide (English only)

The DVD can be used as a source of reference or to print additional copies of the documents. To purchase printed copies of any documentation or to purchase additional copies of the DVD, please contact:

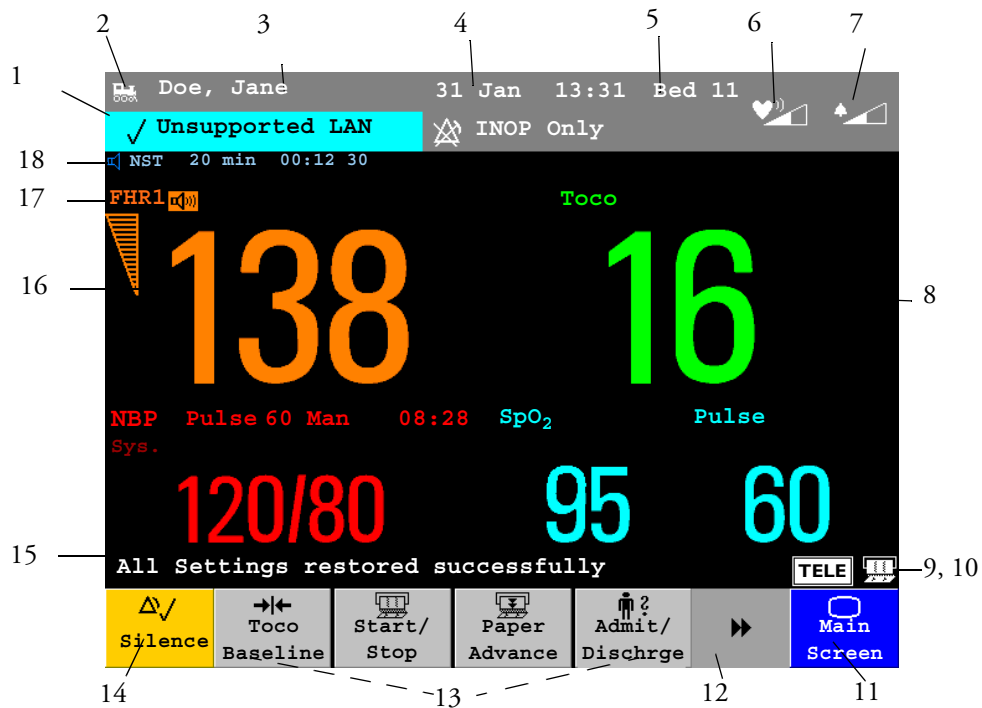
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Knowledge and Skills Test

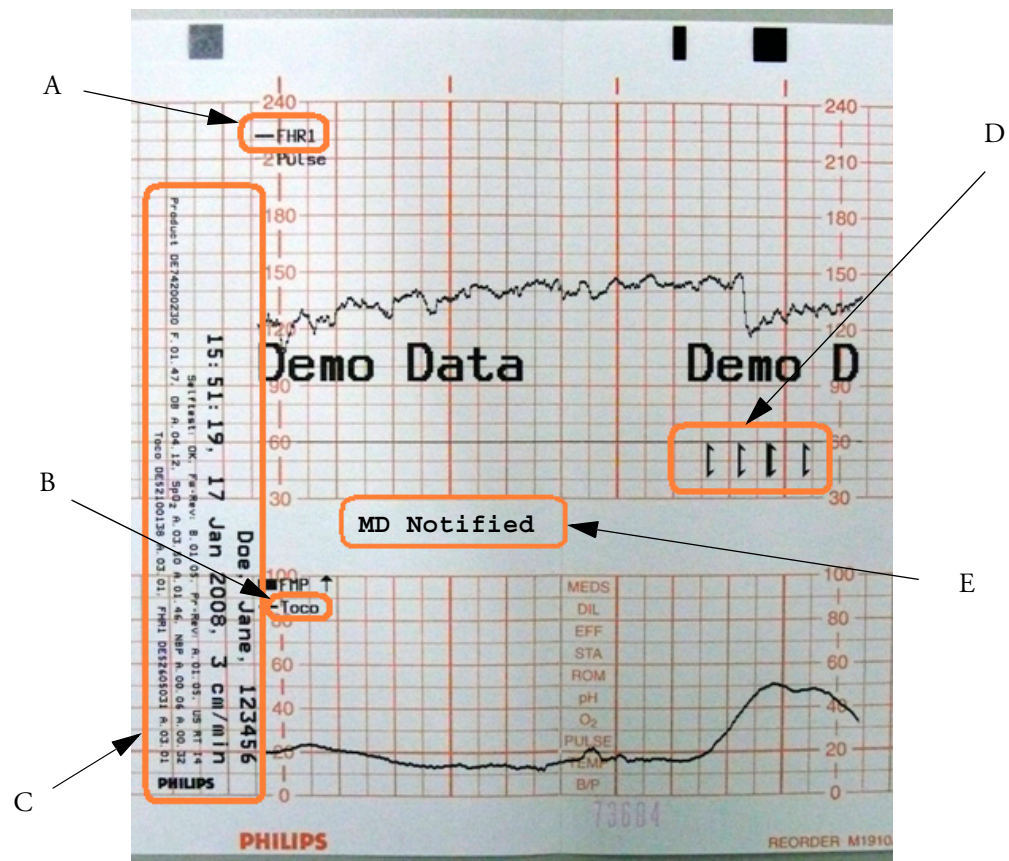
Basic Operation

- 1 Identify each of the following items and describe its function:



- | | | | |
|---|-------|----|-------|
| 1 | _____ | 10 | _____ |
| 2 | _____ | 11 | _____ |
| 3 | _____ | 12 | _____ |
| 4 | _____ | 13 | _____ |
| 5 | _____ | 14 | _____ |
| 6 | _____ | 15 | _____ |
| 7 | _____ | 16 | _____ |
| 8 | _____ | 17 | _____ |
| 9 | _____ | 18 | _____ |

2 Identify each of the following items:



- A. _____
- B. _____
- C. _____
- D. _____
- E. _____

3 Confirm _____ before you start monitoring, and continue to confirm that the _____ is the signal source for the fetal heart rate during monitoring.

4 Load paper in the recorder.

5 Turn the monitor on. The monitor performs a power-on self-test as it starts up. No user interaction is required.

How do you know the self-test has completed successfully?

- 6 Set the date and time to February 29th, 2008, at 13:30.
- 7 a Check the paper scale setting.

- b Can you change this setting in Monitoring mode?
- _____
- 8 Describe the two ways to enter the Fetal recorder menu.
- a _____
- b _____
- 9 Check the paper speed.
- 10 Turn on the recorder. List three items that will be visible at the start of a recording.
- a _____
- b _____
- c _____
- 11 How can you tell at a glance whether the recorder is running or not?
- _____
- 12 You should always tear off paper along a perforation. True or False?
- 13 With the recorder on, mark an event.
- 14 What symbol is displayed on the recorder paper when an event is marked?
- _____
- 15 Where would you plug in the external event marker?
- _____
- 16 Your monitor comes with a set of preconfigured notes. Enter one of these notes.
- 17 Where does the note appear?
- _____
- 18 Your technical department can configure your own set of notes in Configuration Mode. True or False?
- _____
- 19 In the event that the monitor's recorder paper runs out, the monitor is capable of storing trace data in its internal memory for up to:
- A. Twenty four hours, if you are only monitoring one fetus.
- B. Thirty five minutes.
- C. One hour.
- 20 If the monitor runs out of paper and new paper is loaded after 40 minutes, what would you expect to happen (if the Bridge Paperout setting is on)?
- _____
- _____

- 21 Disable the touchscreen and enable it again.
 - 22 List two possible causes of transducer damage in the clinical setting.
-
-

Alarms

- 1 Your monitor needs to be in alarm mode 'All' to enable FHR alerting. True or false?

- 2 Which key will silence the alarm?

- 3 Change the alarm volume.
- 4 What happens when you select the Silence key?
 - A. All active alarms are acknowledged and silenced.
 - B. All alarms are silenced for ten minutes.
 - C. All alarms are switched off for two minutes.
 - D. All alarms, except those indicating a life threatening condition.
- 5 What is an INOP alarm?
 - A. An alarm condition that only occurs IN the OPerating room.
 - B. A patient alarm affecting only yellow alarms.
 - C. A technical alarm that indicates an INOPerative condition has occurred.
 - D. An alarm that occurs when the user changes the operating mode.
- 6 The Pause Alarms key:
 - A. Turns off all yellow alarms.
 - B. Turns off all alarms for one, two or three minutes depending on configuration.
 - C. Turns off all non critical alarms for two minutes.
- 7 How are alarms indicated? (More than one answer may be correct)
 - A. Alarm sounds.
 - B. Alarm messages are displayed.
 - C. Alarm lamps flash.
 - D. Numeric of the measurement in alarm flashes.
- 8 If the pause duration for alarms is configured to infinite, how does the labelling of the Pause Alarms key change?

Admitting and Discharging Patients

- 1 Admit a patient (For standalone systems only).
- 2 Which of the following is/are true?
 - A. You should always admit a patient at the monitor.
 - B. If using an OB TraceVue system, you should admit the patient in the system.
 - C. You should always discharge the patient at the monitor.
 - D. When connected to an OB TraceVue system via a LAN connection, the monitor acts as “master” over patient demographic data.
- 3 To ensure that each episode of a Stored Data Recording refers to the patient labeled on the beginning of the trace paper:
 - A. You should admit and discharge each single patient.
 - B. You should label each printout by hand.
 - C. You should power down the monitor for more than 60 seconds between two patients.
 - D. You should set the monitor into Standby between two patients.
- 4 For the monitor, a new patient (episode) starts with the
 - A. admit of the patient
 - B. discharge of the patient.

Non-Stress Test Timer

- 1 Switch **On** the Non-Stress Test timer (NST) and start it for a run time of twenty minutes. When the set time interval has passed, which of the following will happen? (Select all that apply.)
 - A. A single audible tone is heard.
 - B. Recorder starts a new recording for another 20 minutes interval.
 - C. The color on the display changes from blue to green.
 - D. Fetal monitor turns off.
 - E. The recorder stops if NST Autostop is set to **On**.
 - F. A message appears in the status line on the Main Screen display.

Monitoring FHR and FMP Using Ultrasound

- 1 How can you check the US transducers to ensure they are working properly?

- 2 Generate an artificial FHR. Note what happens to the numeric display, and the signal quality indicator.

- 3 When you are receiving the best possible signal from the ultrasound transducer, the signal quality indicator will be ...

- 4 Adjust the FHR volume.
- 5 FMP detects ...

- 6 FMP is available:
 - A. For all FHR channels.
 - B. Only for the FHR1 channel.
 - C. For the FHR3 channel in the case of triplets monitoring.
 - D. For the FHR channel currently on the loudspeaker.
- 7 How is FMP depicted on a recording?

- 8 Turn FMP off.
- 9 FMP should be disabled when monitoring an ambulant patient using cordless transducers from an Avalon CTS system. True or false?

- 10 Cross-channel verification (CCV) indicates when monitored heart rates (fetal or maternal) coincide. How do you recognize this on the display and on the trace recording?

- 11 You should periodically compare the mother's pulse with the signal coming from the fetal monitor's loudspeaker to ensure you are detecting the fetal heart rate. True or False?

Monitoring Twin and Triple FHRs

- 1 When monitoring multiple fetal heart rates, you can listen to the fetal heart sound from one ultrasound transducer at a time. How do you know which fetus' heart rate is being heard on the loudspeaker?

- 2 Connect a second US transducer. Note what happens to the display.

- 3 Select the fetal heart sound for FHR2.

- 4 When monitoring twins or triplets, the trace separation by an offset of 20 bpm can be helpful because ...
-
-
- 5 Whether monitoring twins or triplets, which of the FHR traces does not have an offset (with the default Separation Order set to Standard)?
-
- 6 When monitoring twins, how is the trace separation indicated on the recording?
-
- 7 When monitoring triplets, what is the offset of FHR 3?
-
- 8 a What action could you take when cross-channel verification has been detected?
-
-
- b How can the Finder LED help in this case?
-
-

Monitoring Uterine Activity Externally

- 1 Plug in the Toco transducer, and note the reading in the Toco numerical display.
-
- 2 How can you check the Toco transducer to ensure it is working properly?
-
-
- 3 How would you identify the Toco transducer when there are also other transducers connected to the monitor?
-
-
- 4 a Reset the Toco baseline.

- b What is the value of the reset baseline?
-
- 5 What indication on the recorded trace shows that you are using an external Toco transducer?
-
- 6 Why might you want to reduce the Toco sensitivity?
-
-
- 7 Change the Toco sensitivity to 50% and note the effect on the paper trace. Then change it back to 100%.

Monitoring Uterine Activity Internally

- 1 Connect the IUP catheter to the patient module via the reusable adapter cable, and connect to the monitor.
 - 2 Zero the intrauterine catheter (IUP). What baseline value will be displayed?
-

Monitoring FHR Using DECG

- 1 Connect the fetal scalp electrode to the DECG adapter cable. Connect the DECG adapter cable to either the Toco+ transducer or the patient module and connect to the monitor.
 - 2 Artifact suppression (arrhythmia 'logic') applies to the signal from which measurement, US or DECG?
 - 3 What is the purpose of artifact suppression?
-
-
- 4 Turn artifact suppression off.
 - 5 Why might you turn artifact suppression off?
-

Monitoring Noninvasive Blood Pressure

- 1 During an NBP measurement, what happens if you select the NBP Start/Stop SmartKey?
 - A. Any current measurement and the automatic NBP cycle itself is stopped.
 - B. Only the current measurement is stopped, the next automatic measurement will occur.

Monitoring SpO₂

- 1 Connect the SpO₂ sensor to the blue socket on the monitor, and take a measurement.
- 2 If **Tone Modulation** is set to **Yes**, what effect does this have?
- 3 Change the QRS volume.
- 4 The SpO₂ desaturation alarm: (select all that apply)
 - A. Is a red level alarm.
 - B. Is a yellow level alarm.
 - C. Sounds immediately if the current SpO₂ is less than the **Desat Limit**.
 - D. Sounds if the current SpO₂ is less than the **Desat Limit** and the **Desat Delay** time has elapsed.
- 5 If you turn the SpO₂ alarm off in the SpO₂ setup menu, the alarm will remain off: (select all that apply)
 - A. Until you change the SpO₂ alarm limits.
 - B. For three minutes.
 - C. For five minutes.
 - D. Until you turn it back on.

Monitoring Maternal Heart / Pulse Rate

- 1 Connect the MEEG adapter cable to the Toco+ transducer and attach the electrodes.
- 2 How would you start printing the MEEG waveform?

- 3 What is the difference between the two choices for printing the MEEG waveform, **Separate** and **Overlap**?
- 4 To change the MEEG alarm limits (in alarm mode: **All**) (More than one answer may be correct.):
 - A. Select the **HR** numeric to open the setup menu.
 - B. Select the **MEEG** waveform to open the setup menu.
 - C. Select the **Main Setup** SmartKey, followed by **Measurements** and then **ECG**.

Cordless Monitoring

- 1 Which of the following are true for cordless fetal transducers?
 - A. A. Toco, ultrasound and ECG transducers are not affected by use in the bath or shower.
 - B. B. DECG and MEEG transducers are validated for use under water.
 - C. C. Water pressure and temperature can affect the Toco baseline.

- D. D. The water affects the transmission range of the transducers.
- E. E. Pulsating water jets can cause artefacts.

Name two types of information that are shown on the two-digit display on cordless fetal transducers.




- 2 How many Avalon CTS systems can you connect to the fetal monitor?

- 3 Which of the following is/are true (select all that apply)?

- A. You can monitor twins, but not triplets, using cordless transducers.
- B. You can use a mixture of wired and cordless transducers.
- C. All wired transducers can remain plugged into the fetal sensor sockets.
- D. To use cordless transducers, disconnect all wired transducers from the monitor.

- 4 How do you connect an Avalon CTS system to the monitor?

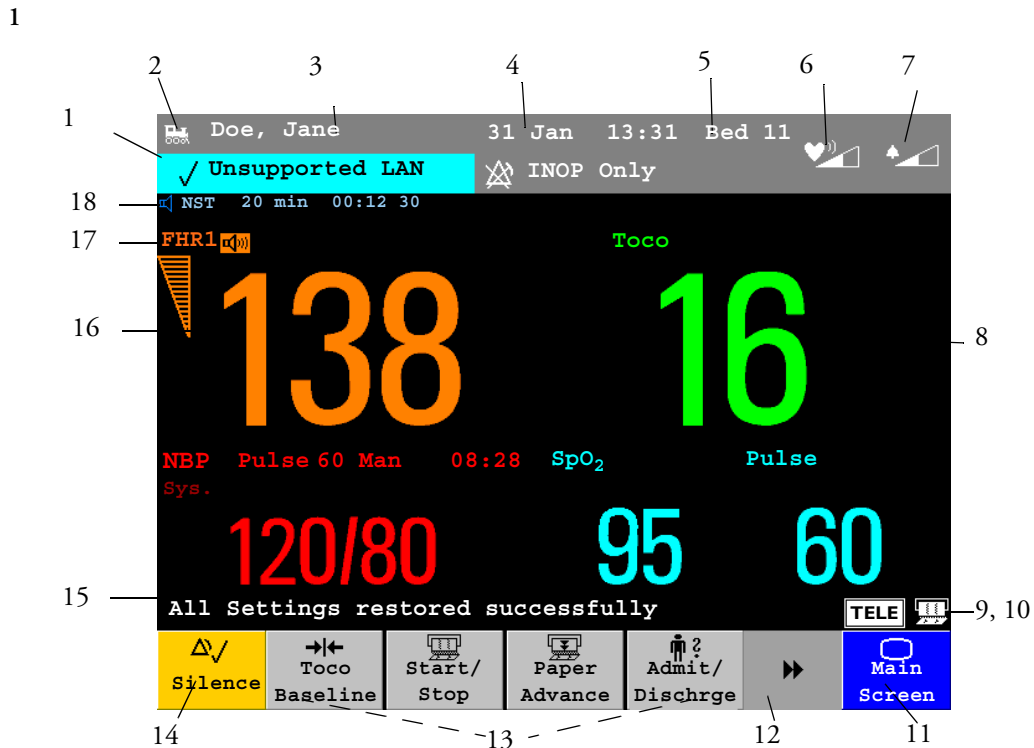
- 5 What do the following indicators mean?

Indicator	Meaning
	
	
	

- 6 When changing back from cordless to wired transducers, put the following list in the correct order:
- A. The monitor switches automatically back to the wired transducers.
 - B. Switch the base station to Standby.
 - C. Dock the cordless transducers in the Avalon CTS base station.
 - D. Continue monitoring.

Answers to Knowledge and Skills Test

Basic Operation



1	INOP and alarm status area	10	Status indicator for fetal trace recorder
2	LAN connection status indicator	11	Main Screen SmartKey
3	Patient identification	12	Scroll to display more SmartKeys
4	Date and time	13	SmartKeys
5	Bed label	14	Silence key
6	Fetal heart sound volume adjust/indicator	15	Status line - shows status and prompt messages
7	Alarm volume adjust/indicator	16	Signal quality indicator
8	Numeric/measurement values	17	Measurement label
9	Status indicator for Avalon CTS system	18	NST timer (off by default)

2

- A. Heart rate label.
- B. Uterine activity label.
- C. Vertically printed trace header.
- D. Event marker.
- E. Manually entered preconfigured note.

- 3 Confirm fetal life before you start monitoring, and continue to confirm that the fetus is the signal source for the fetal heart rate during monitoring.
- 4 Paper loading is different for Avalon FM20/FM30 and Avalon FM40/FM50.


Loading paper: FM20/FM30

- 1 If the recorder is on, press the recorder **Start/Stop** SmartKey or the **Stop Recording** SmartKey to turn it off before loading a new pack of paper.
- 2 Press the paper table release to unlock the paper drawer and then pull the table forward to open it fully.
- 3 Lift out any remaining paper from the tray.
- 4 Prepare to place the new pack of paper in the tray with the bottom side down. The bottom side is indicated by the word STOP printed on the final page of the new pack.
- 5 Unfold the top page of the pack and position the uterine activity scale on the right.
- 6 Slide the pack into the tray.
- 7 Push the paper drawer back until it “clicks” closed.
- 8 Press the recorder **Start/Stop** SmartKey or the **Start Recording** SmartKey to switch on the recorder.
- 9 Annotations of trace information are printed on the trace paper.

Loading Paper: FM40/FM50

- 1 If the recorder is on, press the recorder **Start/Stop** SmartKey or the **Stop Recording** SmartKey to turn it off before loading a new pack of paper.
- 2 Press the paper eject button to open the paper drawer.
- 3 Lift out any remaining paper from the tray.
- 4 Press and hold the paper eject button to partially eject the paper, thus making it easier to remove.
- 5 Hinge the transparent paper guide forward. It is held in the closed position by a small protrusion on each side of the holder.
- 6 Prepare to place the new pack of paper in the tray with the bottom side down. The bottom side is indicated by the word STOP printed on the final page of the new pack.
- 7 Unfold the top page of the pack and position the uterine activity scale on the right.
- 8 Slide the pack into the tray.

- 9 Feed the paper evenly through the paper guide. Do not close the paper guide yet.
 - 10 Close the paper drawer.
 - 11 Now close the paper guide.
 - 12 Press the recorder Start/Stop SmartKey or the Start Recording SmartKey to switch on the recorder.
 - 13 Annotations of trace information are printed on the trace paper.
- 5 After boot up, the monitor sounds a tone, and you can see the monitoring main screen. If recorder power-on auto-start is configured to **On**, the recorder prints "Selftest OK" across the trace paper.
- 6
- a Select the **Date, Time** screen element from the monitor's info line to enter the **Date, Time** menu.
 - b Select, in turn, the **Year, Month, Day, Hour** (in 24 hour format) and **Minute** as necessary.
 - c Select **Store Date, Time** to change date and time.
- If connected to a OB TraceVue system, the monitor uses the OB TraceVue system date and time, including daylight saving time changes.
- 7
- a
 1. Enter the **Main Setup** menu by selecting the **Main Setup** SmartKey.
 2. Select **Fetal Recorder**.
 3. Check the current setting for scale type. If it is not appropriate, change it in the fetal recorder menu in Configuration mode:
 4. Select **Scale Type** to toggle between **US** and **Internat'l**.
 - b In Monitoring mode, you can see these settings (grayed out), but you cannot change them. They can be changed in Configuration mode.
- 8
- a **Main Setup-> Fetal Recorder**
 - b Touch the recorder status indicator.
- 9 To check paper speed:
- a Enter the **Main Setup** menu using the **Main Setup** SmartKey.
 - b Select **Fetal Recorder**.
 - c In the recorder menu, you can see the current speed setting greyed-out.
 - d In Configuration mode, it is possible to set the paper speed to **1, 2** or **3** cm/min.
- 10 Any three of the following:
- a "Selftest OK": confirmation that the monitor's self-test completed successfully.
 - b the software revision and firmware revision.
 - c the serial number.
 - d the time.
 - e the date.
 - f patient name and medical record number (if entered).
 - g the paper speed.
 - h the parameters plugged in.

- 11 By checking the recorder status indicator.
- 12 True.
- 13 To mark an event on the trace paper you can:
 - a Select the **Set Marker** SmartKey, or
 - b Press the button on the remote event marker. The remote event marker is connected to the monitor via any fetal transducer socket.
- 14 Event marker symbol , on the FHR scale at the exact time the button or key was pressed.
- 15 Into any of the four (red) fetal sensor sockets.

- 16 To enter a note:
 - a Press the **Enter Notes** SmartKey to open the **Enter Note** menu.
 - b Scroll if necessary, then select the note you wish to enter. A confirmation dialog box opens:

To store and record the note select Confirm. Select Cancel to reject the current note.	Confirm	Cancel
---	----------------	---------------

- c Select Confirm to enter the note. The note is then shown in the status line of the display and is annotated on the fetal trace if the fetal recorder is on.
- 17 By default, notes are printed lengthwise in the direction of the trace, in the space between the FHR grid and the uterine activity grid.

If you prefer, you can configure the recorder to print across the trace. You can change this in Configuration mode by changing the **Notes Recording** setting in the fetal recorder menu from **Along** (default) to **Across** (notes print “widthwise” across the trace).

Up to two notes can be printed directly, and the monitor can temporarily store up to a further two notes, and these are printed after the first two have been recorded. Any further notes are discarded. For example, if you enter six notes in quick succession, the first two notes you entered are recorded straight away, the next two are stored in memory and then printed when the first two have been recorded, and the last two are discarded.


If the printing of two notes happens to coincide with the regular recording of the time stamp that takes place once every ten minutes, the time stamp is delayed until the notes have finished printing.

- 18 True.
- 19 C.
- 20 If the paper has run out and you load new paper, all trace data for the period (up to one hour) of when the paper was out is stored in memory and printed out automatically at high speed as soon as the recorder restarts. For this, the Bridge Paperout setting must be On (default). As the paper was out for forty minutes (less than one hour), all data would be safeguarded and printed on the recorder trace first, before carrying on with the real-time trace recording.
- 21 To temporarily disable touchscreen operation of the monitor, press and hold the **Main Screen** permanent key for about three seconds. A red padlock will blink on the Main Screen permanent key.
Press and hold the **Main Screen** permanent key again for about three seconds to re-enable touchscreen operation.

- 22 The major way a transducer can be damaged is by improper handling such as dropping the transducers, running over them with a bed, or wrapping the cords too tightly.

Alarms

- 1 True. Your monitor needs to be in alarm mode 'All' to enable any alarming, including fetal heart rate alarming.
- 2 The Silence Smartkey.
- 3

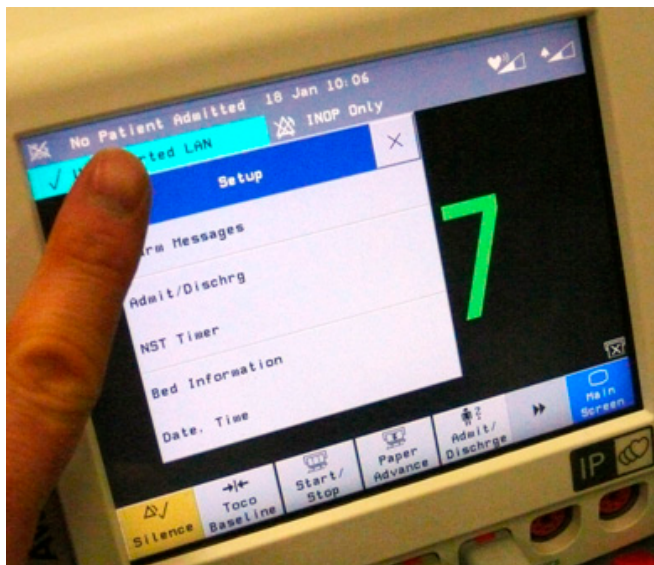


This **alarm volume indicator** at the top right of the monitor screen gives you an indication of the current alarm volume. To change the volume:

 - a Touch **alarm volume indicator**.
 - b Pick the required volume from the pop-up volume scale.
- 4 A.
- 5 C.
- 6 B.
- 7 A, B, D. Avalon fetal monitors, unlike IntelliVue monitors, have no alarm lamps.
- 8 The labelling changes to **Alarms Off**.

Admitting and Discharging Patients

- 1 To access the **Patient Demographics** window:
 - a Touch the gray information line at the top of the screen then select **Admit/Dischrg** from the menu that opens:



- b Touch the **Admit Patient** pop-up key.

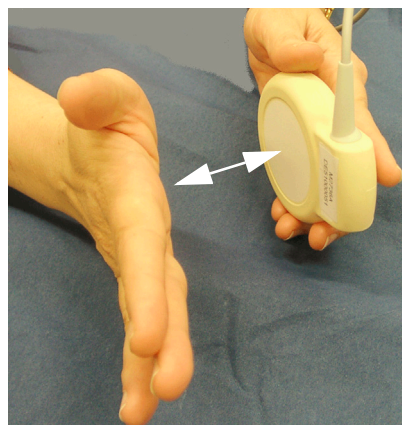
- c Enter **Last Name**, using the on-screen keyboard, and press **Enter**.
 - d Repeat for **First Name** and **MRN**, then select **Confirm**.
- 2 B and C.
- 3 A. To ensure a proper identification of the recorded paper traces, it is highly recommended to admit and discharge each single patient. Even though a new episode for Stored Data Recording is also created after power-off/on for more than 60 seconds, after Standby, and a change into Service mode.
- 4 B. Discharge resets the monitor to the user defaults and creates a new patient (episode). Additionally, the admission of a patient with her name is a useful feature of documentation.

Non-Stress Test Timer

- 1 A, C, E, F.


Monitoring FHR and FMP Using Ultrasound

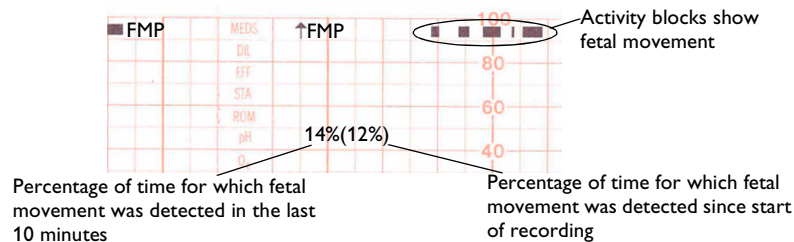
- 1 If any of the following tests fail, repeat the test using another transducer. If the second transducer passes the tests, confirming that the first transducer is defective, contact your service personnel. If the second transducer also fails the tests, contact your service personnel.
- To test an ultrasound transducer:
- a Switch on the monitor and the recorder.
 - b Connect the transducer to the fetal monitor.
 - c Select the fetal heart sound for this channel.
 - d Increase the loudspeaker volume to an audible level.
 - e Holding the transducer in one hand, move your other hand repeatedly towards and then away from the surface, or lightly tap to generate sound.





- f Check that a noise is heard from the loudspeaker. The loudspeaker should sound for each simulated beat.
- 2 See the answer above. The value on the numeric display should increase with increased frequency of moving the hand/tapping. The signal quality indicator will vary in how full it is showing. A

good, regular signal will make the signal quality indicator full, whereas with a weak signal it will be empty. An acceptable trace is possible with medium/acceptable state.

- 3 Full.
- 4 To change the fetal heart sound volume:
 - a Touch the  symbol.
 - b Pick the required volume from the pop-up volume scale.
- 5 FMP detects gross fetal body movements via an ultrasound transducer.
- 6 B.
- 7 FMP is shown by activity blocks on the recording. Statistics for the amount of activity are also given.






- 8 You can switch FMP on and off from any FHR channel. For example, to set it from the FHR1 channel:
 - a Enter the **FHR1 Setup Menu**.
 - b Select **Fetal Movement** to toggle between **On** and **Off**.
 - c Return to the main screen.
- 9 True.
- 10 CCV indicates when monitored heart rates (fetal or maternal) coincide, by displaying the symbol  on the screen, and  on the trace recording.



- 11 True.

Monitoring Twin and Triple FHRs

- 1 You see the audio source symbol  next to the FHR numeric label for the channel you are listening to: **FHR2** .
- 2 The display automatically adjusts the screen for the new numeric.
- 3 To select the fetal heart sound:
 - a Enter the **Setup FHR** menu for the channel you want to hear.
 - b Press **Select Audio**. It may take a few seconds for the audio source symbol  to appear.
- 4 When monitoring multiple fetal heart rates, the FHR offset may be helpful because you can separate the similar baselines for easier interpretation of the recorded trace. The FHR value displayed on the fetal monitor is the correct value.

- 5 With **Separation Order** set to **Standard**, the trace displays FHR1 without an offset. With **Separation Order** set to **Classic**, the trace displays FHR2 without an offset. Separation order Classic has to be configured in Configuration mode.
- 6 A vertical dotted line on the FHR trace shows that the offset is active. The trace shows the offset symbol of **+20** or **-20**. This is repeated every five cm of trace.
- 7 When monitoring triplets, FHR3 has a baseline offset of -20 bpm.
- 8
 - a Reposition the transducers using the sound from the loudspeaker so that each US transducer picks up the sound from a different fetus.
 - b Touch a **FHR** numeric on the screen...



...and the bright, blue **Finder** LED lights up on the corresponding transducer monitoring that channel. This lets you rapidly identify the transducer, so that you can reposition it speedily.



Monitoring Uterine Activity Externally

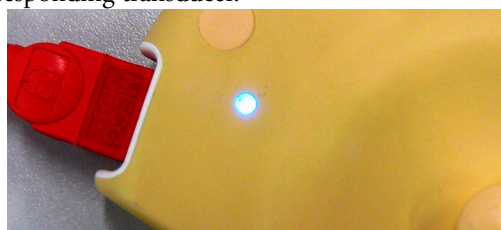
- 1 After plugging in, **Toco** numeric appears on screen and the Toco value (unloaded) should be around 18 to 22. Press on the Toco transducer and note the pattern on the trace and value on the screen.
- 2 If any of the following tests fail, repeat the test using another transducer. If the second transducer passes the tests, confirming that the first transducer is defective, contact your service personnel. If the second transducer also fails the tests, contact your Philips service personnel.
To test a Toco transducer:
 - a Switch on the monitor and the recorder.
 - b Connect the transducer to the fetal monitor.


- c Gently apply pressure to the pick-up button.



- d Check that the value on the display and paper shows this change in pressure.

- 3 The blue Finder LED on a wired fetal transducer illuminates when you touch the measurement on the screen, allowing you to identify the corresponding transducer.



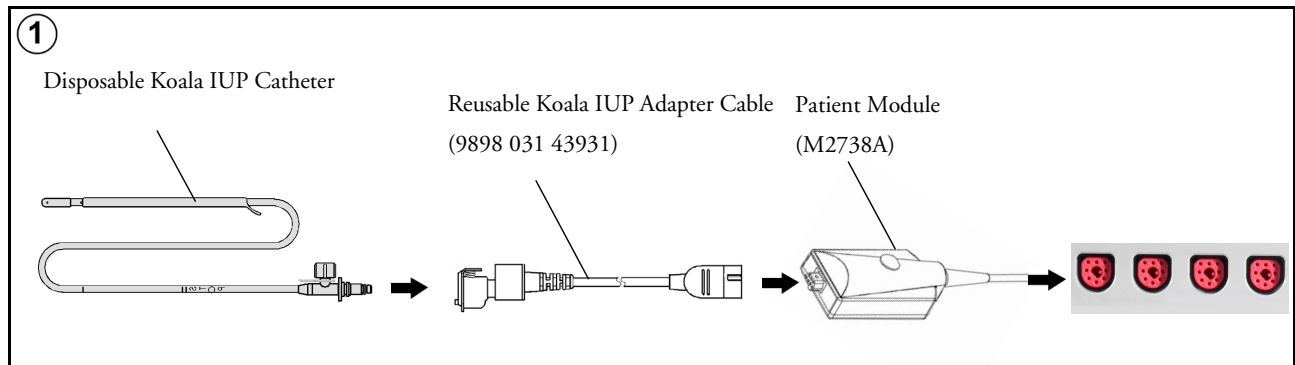
- 4 a Press the .
- b 20
- 5 The trace will display 'Toco' to indicate an external Toco transducer is in use.
- 6 If the Toco trace exceeds the paper scale, you may reduce the Toco sensitivity to 50% so that the trace stays within the scale (default is 100%).
- 7 To change the Toco sensitivity:
- Touch the **Toco** numeric to enter the **Setup Toco** menu.
 - Touch **Toco Gain** to toggle between **100%** and **50%**.

Note: Under normal circumstances, the Toco should be set to its baseline correctly before adjusting the gain.

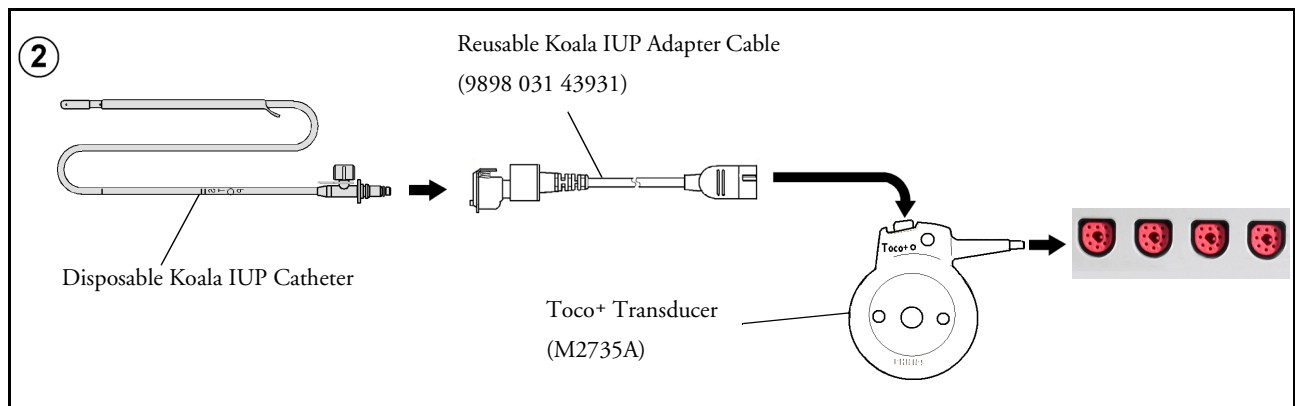
A wave may exceed 100 because the resting tone is too high. If, after repositioning or setting the transducer to its baseline, the wave still exceeds 100, adjust the gain.

Monitoring Uterine Activity Internally

- 1 Illustration ① shows the complete connection chain from the IUP catheter to the fetal monitor using the patient module:



- Illustration ② shows the complete connection chain from the IUP catheter to the fetal monitor using the Toco⁺ transducer:



- 2 In the **Setup IUP** menu, select **Zero IUP**. The value is zero.

Monitoring FHR Using DECG

- 1 Illustration ① shows the complete connection chain from the fetal scalp electrode to the fetal monitor using the Toco+ transducer.

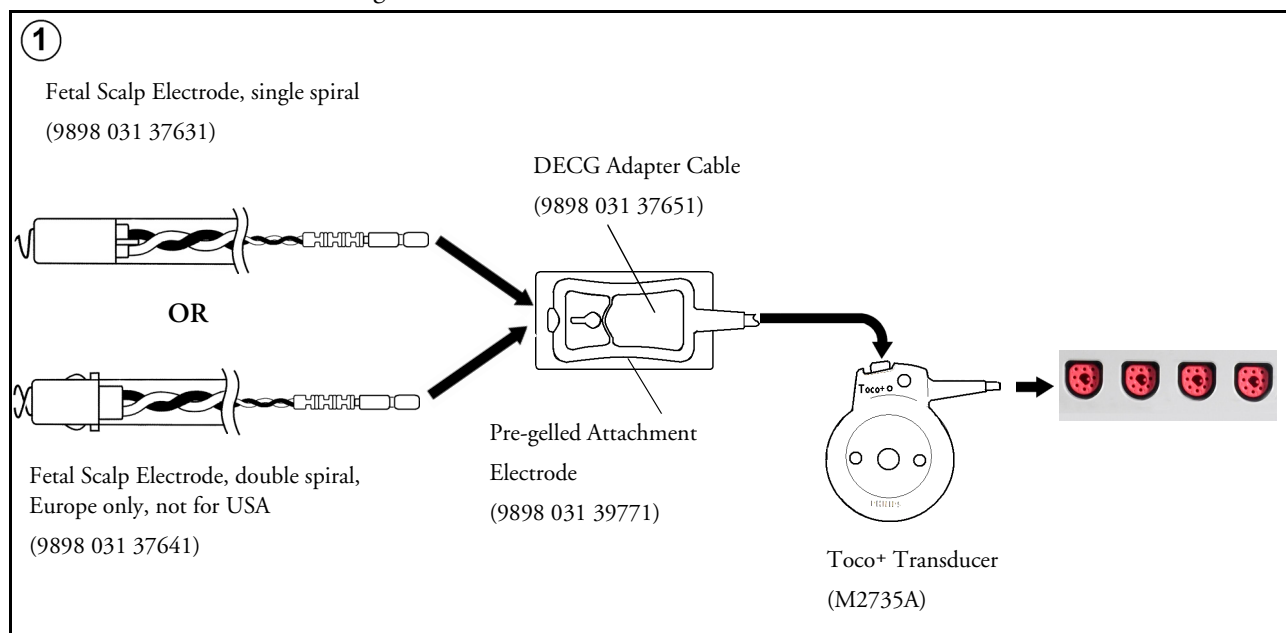
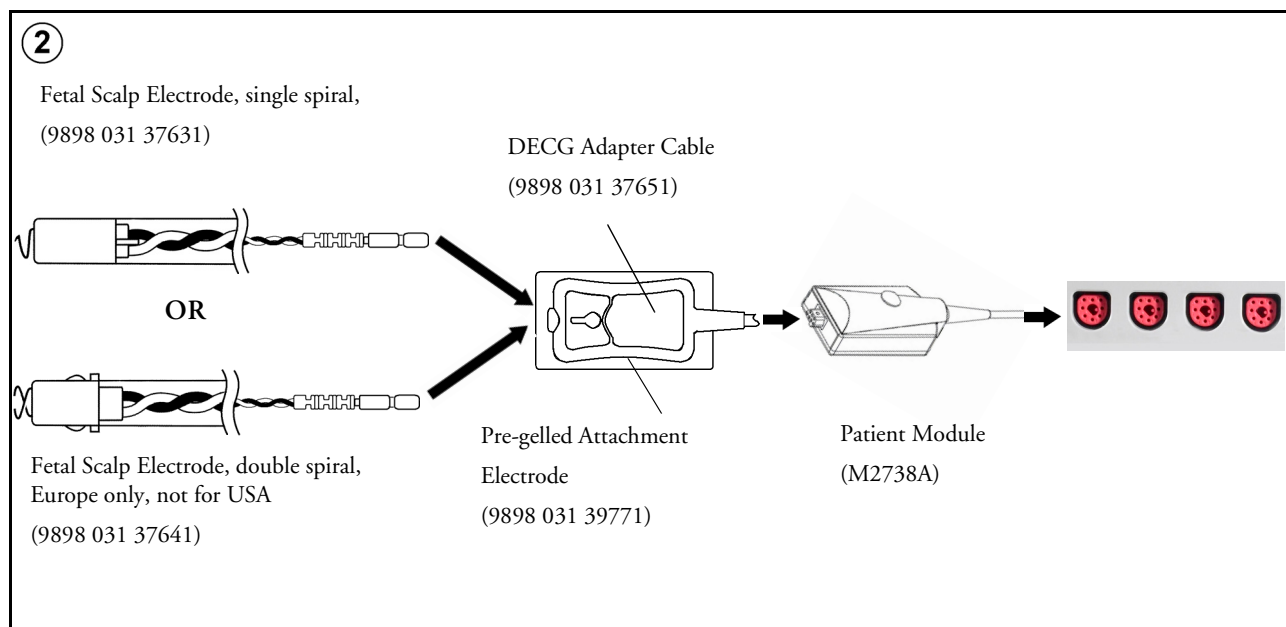


Illustration ② shows the equivalent chain using the patient module.



- 2 DECG.
- 3 The purpose of artifact suppression is to avoid recording artifacts. When **On**, it does not record instantaneous heart rate changes of greater than 28 bpm and resumes when successive beats fall in predetermined limits. The FHR numeric displays the detected value and the audio speaker beeps appropriately for each beat detected.

- 4 To turn artifact suppression **On** and **Off**:
 - a Touch the DFHR numeric to enter the DFHR menu.
 - b Select **ArtifactSuppress** to toggle between **On** (artifacts are suppressed) and **Off** (no artifact suppression).
- 5 If you suspect fetal arrhythmia.

Monitoring Noninvasive Blood Pressure

- 1 B.

Monitoring SpO₂

- 1 The SpO₂ numeric appears, with a readout of the oxygen saturation.
- 2 If tone modulation is on, the QRS tone pitch lowers when the SpO₂ level drops. Remember, the QRS tone is derived from either heart rate or pulse depending on which is currently selected as the active alarm source.
- 3 In the **Setup SpO₂** menu, select **QRS Volume** and set the appropriate QRS tone volume.
- 4 A, D.
- 5 D

Monitoring Maternal Heart / Pulse Rate

- 1 Illustration ① shows the complete connection chain from the foam electrodes applied to the patient to the fetal monitor using the patient module.

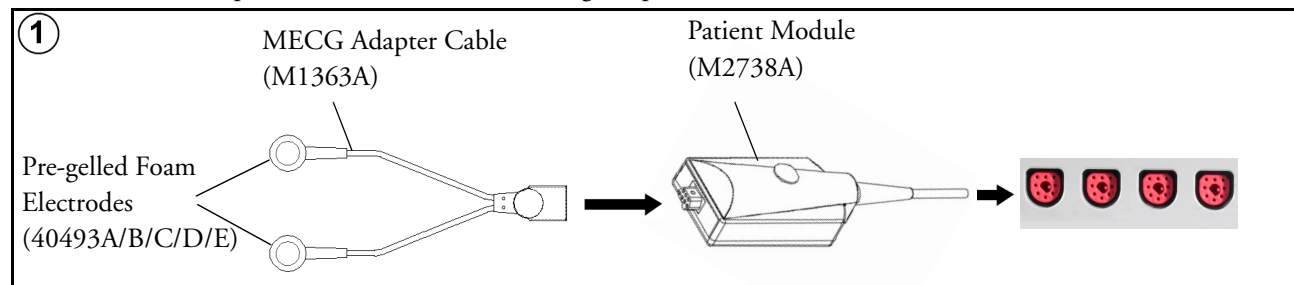
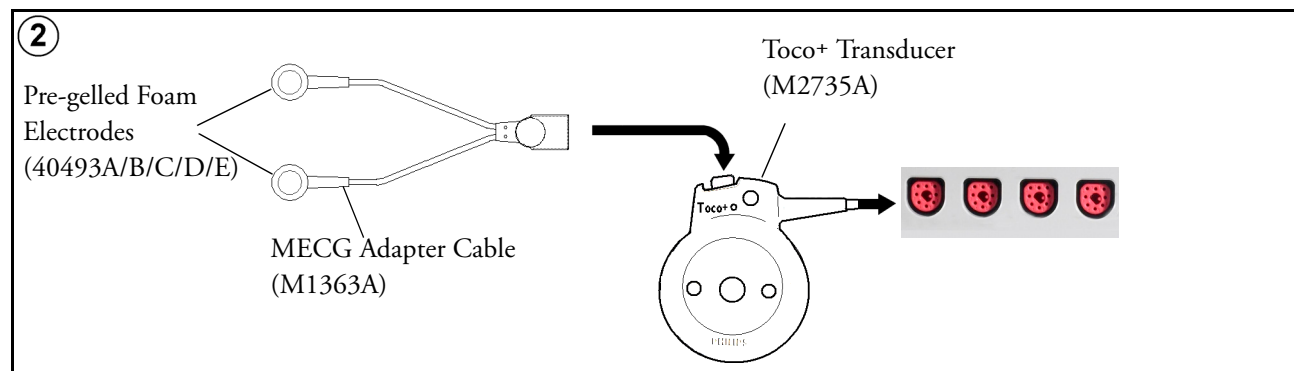


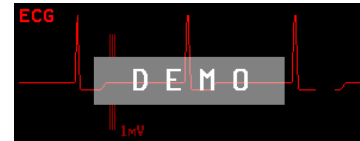
Illustration ② shows the equivalent chain using the Toco+ transducer.



- 2 Either:
 - a Enter the **Start ECG** SmartKey,



Or:
Touch the MEKG wave.



Select **Start ECG Wave** from the ECG wave menu.

Or:




- b Enter the **Main Setup** menu by selecting the SmartKey.
 - c Select **Fetal Recorder** to enter the fetal recorder menu.
 - d Select **Start ECG Wave**.
- 3 **Separate:** records a six-second MEKG strip in fast printout mode. This is in real-time, so temporarily interrupts fetal trace recording while MEKG strip prints.
Overlap: records a delayed six-second MEKG snapshot for documentation on the fetal trace, without interrupting the fetal trace.
- 4 A, C.



Cordless Monitoring

- 1 A, C, D and E.
- 2 Any two of:
 - a the unique base station identification number (bed label),
 - b error and warning codes,
 - c configuration settings.
- 3 One Avalon CTS cordless fetal transducer system can be connected at a time.
- 4 C.
- 5 Connect Avalon CTS via the M2731-60001 interface cable (with red connector) or via the M2732-60001 interface cable (with black connector - for FM40/50 only) to the fetal monitor. All wired transducers can remain plugged into the fetal sensor sockets. Check the Avalon CTS indicator on the fetal monitor screen.

6

Indicator	Meaning
	Avalon CTS interface cable is connected to the monitor, but Avalon CTS base station is in Standby, is not connected to the interface cable, or is disconnected from AC mains.
	Avalon CTS interface cable is connected to the monitor, Avalon CTS base station is connected, powered on, and cordless transducers are ready to use, but no cordless transducers are currently active (all are still docked in the base station).
	Avalon CTS interface cable is connected to the monitor, Avalon CTS base station is connected, powered on, and at least one cordless transducer has been taken out of the base station and is active. Any connected wired transducers are disabled.

7 C, B, A, D.

Skills Checklist Fetal Monitor

X	(check applicable monitor)
	Avalon FM20
	Avalon FM30
	Avalon FM40
	Avalon FM50

Name: _____ Test Date: _____

Hospital: _____ Unit: _____

Observer: _____ Signature: _____

Tasks	n/a	Needs review	Pass	Comments
	check applicable			
Basics to start monitoring immediately				
• Switch On the monitor.				
• Identify and describe the controls, indicators and connectors of the Avalon fetal monitor.				
• Identify and describe the screen content.				
• Describe the principle methods of operating your monitor.				
• Describe the different SmartKeys.				
• Remove and reload recorder paper.				
• Place the FHR transducer into the socket and perform a quick US transducer test.				
• Describe FHR numeric, tone, and the signal quality indicator.				
• Change the FHR and alarm tone volume.				
• Place the Toco transducer into the socket and reset the Toco baseline.				
• Describe the changes on the screen.				

4 Skills Checklist Fetal Monitor

Tasks	n/a	Needs review	Pass	Comments
	check applicable			
<ul style="list-style-type: none">• Switch On the recorder.• Describe the displayed status indicator.• After a few seconds, perform a Paper Advance.• Explain the printed paper trace.				
<ul style="list-style-type: none">• Place the Toco transducer into the socket, and generate an artificial Toco wave onto the paper trace.• Describe Toco numeric and paper trace.				
<ul style="list-style-type: none">• Activate and leave Monitor Standby.				
<ul style="list-style-type: none">• Switch off the monitor (at the end of all tasks)				
Fetal Movement Profile				
<ul style="list-style-type: none">• Explain the Fetal Movement Profile (FMP) capability.				
Demo Mode				
<ul style="list-style-type: none">• Activate Demo mode.• Explain when to use Demo mode and what reasonable precautions have to be taught when using Demo mode.• Exit Demo mode.				
Direct ECG via Scalp Electrode (DECG)				
<ul style="list-style-type: none">• Setup the DECG measurement.• Explain the DECG measurement appearance on the screen and on the paper trace.• Explain and change Artifact Suppression.				
Uterine Activity Internally (IUP)				
<ul style="list-style-type: none">• Setup the IUP measurement.• Explain the IUP measurement appearance on the screen and on the paper trace.• Explain and perform a zeroing of the IUP measurement.				

Tasks	n/a	Needs review	Pass	Comments
	check applicable			
Cordless Transducer System - Avalon CTS				
<ul style="list-style-type: none">• Connect Avalon CTS to the monitor.• Perform the different Avalon CTS indicators on the fetal monitor screen.• Explain all changes on the fetal monitor screen.				
Monitoring Twins or triplets				
<ul style="list-style-type: none">• Setup the monitor for monitoring twins or triplets.• Activate Demo mode.				
<ul style="list-style-type: none">• Change the audible sound to another FHR.• Describe and show the blue finder LED.				
<ul style="list-style-type: none">• Perform a paper trace and describe the changes when Trace Separation is set to On.				
<ul style="list-style-type: none">• Exit Demo mode.				
Noninvasive Blood Pressure (NBP)				
<ul style="list-style-type: none">• Setup the NBP measurement by attaching a correctly sized cuff to an arm.• Perform at least two measurements, one manually and one automatically.• Change the repetition time.• Switch the NBP measurement Off manually. Describe and show the way to switch it On again.				
SpO ₂ and Pulse Rate				
<ul style="list-style-type: none">• Setup the SpO₂ measurement by attaching a correctly sized sensor.• Explain and change QRS volume and tone modulation.				
Maternal ECG (MECG)				
<ul style="list-style-type: none">• Setup the MECG measurement.• Explain the MECG measurement appearance on the screen and on the paper trace.				
<ul style="list-style-type: none">• Explain the Cross-Channel Verification capability and the advantages of monitoring the maternal heart rate.				

4 Skills Checklist Fetal Monitor

Tasks	n/a	Needs review	Pass	Comments
	check applicable			
Entering Notes				
<ul style="list-style-type: none">Enter at least two different notes onto the paper trace.				
Marking an Event				
<ul style="list-style-type: none">Connect the remote event marker to the monitor.Perform at least two markers onto the paper trace.Explain the usage of event markers.				
Admitting and Discharging Patients				
<ul style="list-style-type: none">Admit a patient.Change or add information to the patient.Explain what kind of effects a patient discharge has.Give reasons to admit and discharge patients on a regularly base.				
Fetal Monitoring and OB TraceVue				
<ul style="list-style-type: none">Explain the different status indicators when the fetal monitor is connected to an OB TraceVue system.				
Alarm Settings				
<ul style="list-style-type: none">Explain the alarm concept of the fetal monitor.Switch all alarms Off and On.Show and describe the Review Alarms capability.				
Stored Data Recording				
<ul style="list-style-type: none">Perform at least one data record of stored data.Describe the Stored Data Recording capability.				
Non-Stress Test Timer (NST)				
<ul style="list-style-type: none">Setup and start the NST.Describe the usage of the NST.				

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